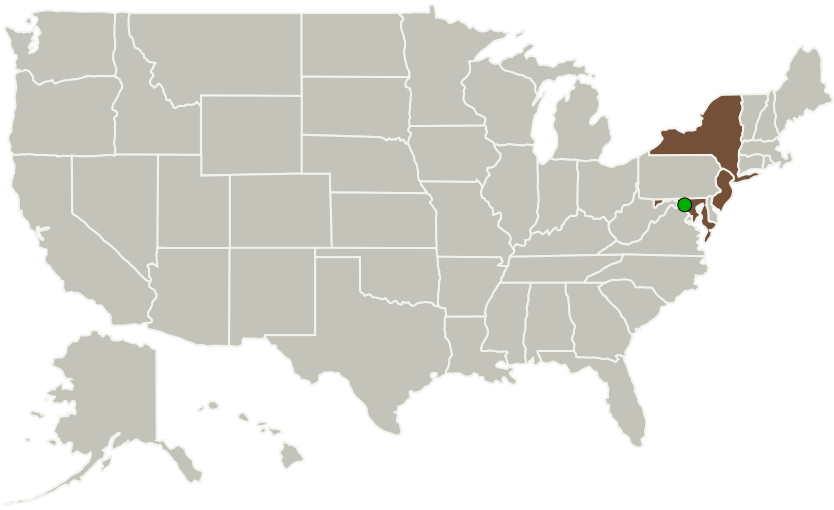
Hybrid Integrated Photonics for Ultrahigh Throughput Optical Signal Processing, Phase I

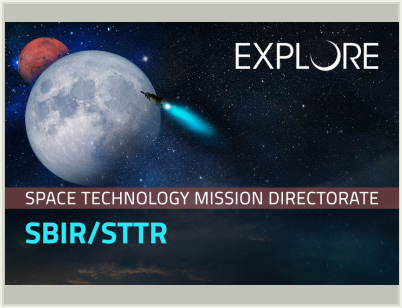
Completed Technology Project (2010 - 2011)

Project Introduction

Structured Materials Industries, Inc. and Cornell University propose to develop high speed integrated photonic switches and WDM for LIDAR applications. The team has recently shown that single mode silicon nitride (Si3N4) waveguides to have very low propagation losses. This material is an ideal candidate for the propagation and manipulation of optical signals at LIDAR wavelengths (1.06 µm). It is possible to imbue electro-optic (EO) properties to these waveguides using an electro-optic polymer. Such polymers have been demonstrated to have very high switching speeds, where light signals were modulated at frequencies in excess of 1 THz. The program will address the efficient integration of active hybrid materials for externally controlling the silicon nitride photonic structures for the goal of obtaining high speed (< 1 ns) switches. Furthermore, these devices also will have qualities that are attractive to this LIDAR project with their compact size, low power consumption and power efficiency. Solutions to these technical challenges will enable the design of systems of unprecedented performance. This program begins at Technology Readiness Level (TRL) 2, will advance to TRL 3 at the end of Phase I and products will achieve TRL 6 at the end of Phase II.

Primary U.S. Work Locations and Key Partners





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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Structured Materials Industries, Inc.	Lead Organization	Industry	Piscataway, New Jersey
Cornell University	Supporting Organization	Academia	Ithaca, New York
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	New Jersey
New York	

Project Transitions

January 2010: Project Start

January 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139094)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Structured Materials Industries, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

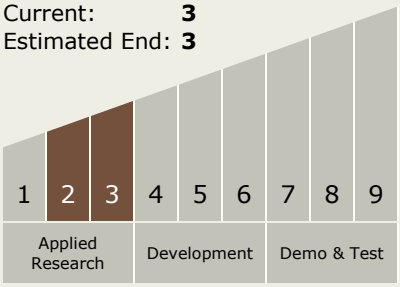
Carlos Torrez

Principal Investigator:

Bruce Willner

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System